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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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In re Application of: Pelrine, et al.

Attorney Docket No.: SRI1P029

Application No.: 09/779,373

Examiner: To Be Advised

Filed: February 7, 2001

Group: 2834

#4/IDS
Hawkins
10/11/01

Title: ENERGY EFFICIENT ELECTROACTIVE
POLYMERS AND ELECTROACTIVE POLYMER
DEVICES

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail to: Commissioner for Patents, Washington, DC 20231 on August 7, 2001.

Signed: _____

Deborah Neill

Deborah Neill

**INFORMATION DISCLOSURE STATEMENT
37 CFR §§1.56 AND 1.97(b)**

Commissioner for Patents
Washington, DC 20231

Dear Sir:

The references listed in the attached PTO Form 1449, copies of which are attached, may be material to examination of the above-identified patent application. Applicants submit these references in compliance with their duty of disclosure pursuant to 37 CFR §§1.56 and 1.97. The Examiner is requested to make these references of official record in this application.

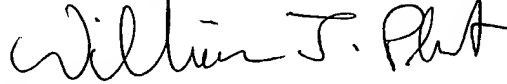
This Information Disclosure Statement is not to be construed as a representation that a search has been made, that additional information material to the examination of this application does not exist, or that these references indeed constitute prior art.

This Information Disclosure Statement is: (i) filed within three (3) months of the filing date of the above-referenced application, (ii) believed to be filed before the mailing date of a first Office Action on the merits, or (iii) believed to be filed before the mailing of a first Office Action after the filing of a Request for Continued Examination under §1.114. Accordingly, it is

believed that no fees are due in connection with the filing of this Information Disclosure Statement. However, if it is determined that any fees are due, the Commissioner is hereby authorized to charge such fees to Deposit Account 500388 (Order No. SRI1P029).

Respectfully submitted,

BEYER WEAVER & THOMAS, LLP

A handwritten signature in black ink, appearing to read "William J. Plut". The signature is fluid and cursive, with the first name "William" being the most prominent part.

William J. Plut

Limited Recognition Under 37 C.F.R. §10.9(b)

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Form 1449 (Modified)	Atty. Docket No. SRI1P029	Application No.: 09/779,373
Information Disclosure Statement By Applicant	Applicant: Pelrine, et al.	
(Use Several Sheets if Necessary)	Filing Date 02/07/01	Group 2834

U.S. Patent Documents

Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
	A	6,048,622	04/11/00	Hagood, <i>et al.</i>			02/09/99
	B	5,915,377	06/29/99	Coffee			01/24/97
	C	5,902,836	05/11/99	Bennet, <i>et al.</i>			08/23/95
	D	5,835,453	11/10/98	Wynne, <i>et al.</i>			05/05/97
	E	5,642,015	06/24/97	Whitehead, <i>et al.</i>			05/01/95
	F	5,430,565	07/04/95	Yamanouchi, <i>et al.</i>			06/02/93
	G	5,254,296	10/19/93	Perlman			11/13/91
	H	5,250,784	10/05/93	Muller, <i>et al.</i>			10/24/91
	I	5,229,979	07/20/93	Scheinbeim, <i>et al.</i>			12/13/91
	J	5,024,872	06/18/91	Wilson, <i>et al.</i>			08/13/87
	K	4,969,197	11/06/90	Takaya			02/21/89
	L	4,885,783	12/05/89	Whitehead, <i>et al.</i>			04/10/87
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	O	4,401,911	08/30/83	Ravinet, <i>et al.</i>			03/02/81
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	R	3,403,234	09/24/68	Barnes, Jr.			09/11/64

Foreign Patent or Published Foreign Patent Application

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
	S	WO 01/06575	01/25/01	PCT			X	
	T	WO 98/35529	08/13/98	PCT			X	
	U	WO 95/08905	03/30/95	PCT			X	

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	V	Ajluni, Cheryl, "Pressure Sensors Strive to Stay on Top, New Silicon Micromachining Techniques and Designs Promise Higher Performance", <i>Electronic Design - Advanced Technology Series</i> , October 3, 1994, pp. 67-74
	W	Anderson, R. A., "Mechanical Stress in a Dielectric Solid From a Uniform Electric Field", <i>The American Physical Society</i> , 1986, pp. 1302-1307
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	X	Aramaki, S., S. Kaneko, K. Arai, Y. Takahashi, H. Adachi, and K. Yanagisawa. 1995. "Tube Type Micro Manipulator Using Shape Memory Alloy (SMA)," <i>Proceedings of the IEEE Sixth International Symposium on Micro Machine and Human Science</i> , Nagoya, Japan, pp. 115-120.
	Y	Ashley, S., "Smart Skis and Other Adaptive Structures", <i>Mechanical Engineering</i> , November 1995, pp. 77-81
	Z	Bar-Cohen, Yoseph, JPL, <i>WorldWide ElectroActive Polymers, EAP (Artificial Muscles) Newsletter</i> , Vol. 1, No. 1, June 1999.
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	A2	Bar-Cohen, Yoseph, JPL, <i>WorldWide ElectroActive Polymers, EAP (Artificial Muscles) Newsletter</i> , Vol. 2, No. 1, July 2000.
	A3	Bar-Cohen, Yoseph, JPL, <i>WorldWide ElectroActive Polymers, EAP (Artificial Muscles) Newsletter</i> , Vol. 2, No. 2, December 2000.
	A4	Bar-Cohen, Yoseph, JPL, <i>WorldWide ElectroActive Polymers, EAP (Artificial Muscles) Newsletter</i> , Vol. 3, No.1, June 2001.
	A5	Bar-Cohen, Yoseph, JPL, <i>WorldWide Electroactive Polymer Actuators Webhub</i> webpages 1-7, http://ndcaa.jpl.nasa.gov/nasa-nde/lommas/eap/EAP-web.htm , downloaded July 23, 2001.
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	A8	Bharti, V., Y. Ye, T.-B. Xu and Q. M. Zhang, "Correlation Between Large Electrostrictive Strain and Relaxor Behavior with Structural Changes Induced in P(VDF-TrFE) Copolymer by electron Irradiation," <i>Mat. Res. Soc. Symp. Proc.</i> Vol 541, pp. 653-659 (1999).
	A9	Bharti, V., Z.-Y. Cheng, S. Gross, T.-B. Xu, and Q. M. Zhang, "High electrostrictive strain under high mechanical stress in electron-irradiated poly(vinylidene fluoride-trifluoroethylene) copolymer," <i>Appl. Phys. Lett.</i> Vol. 75, 2653-2655 (October 25, 1999).
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	B1	Bharti, V., H. S. Xu, G. Shanthi, and Q. M. Zhang, "Polarization and Structural Properties of High Energy Electron Irradiated Poly(vinylidene fluoride-trifluoroethylene) Copolymer Films," to be published in <i>J. Appl. Phys.</i> (2000).
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	B3	Bobbio, S., M Kellam, B. Dudley, S. Goodwin Johansson, S. Jones, J. Jacobson, F. Tranjan, and T. DuBois, "Integrated Force Arrays," in <i>Proc. IEEE Micro ElectroMechanical Systems Workshop</i> , Fort Lauderdale, Florida February 1993.
	B4	Bohon, K., and S. Krause, "An Electrorheological Fluid and Siloxane Gel Based Electromechanical Actuator: Working Toward an Artificial Muscle," to be published in <i>J. Polymer Sci., Part B. Polymer Phys.</i> (2000)
	B5	Brock, D. L., "Review of Artificial Muscle based on Contractile Polymers," MIT Artificial Intelligence Laboratory, A.I. Memo No. 1330, Nov. 1991.
	B6	Caldwell, D., G. Medrano-Cerda, and M. Goodwin, "Characteristics and Adaptive Control of Pneumatic Muscle Actuators for a Robotic Elbow," <i>Proc. IEEE Int. Conference on Robotics and Automation</i> , San Diego, California (8-13 May 1994).
	B7	Calvert, P. and Z. Liu, "Electrically stimulated bilayer hydrogels as muscles," <i>Proceedings of the SPIE International Symposium on Smart Structures and Materials: Electro-Active Polymer Actuators and Devices</i> , March 1-2, 1999, Newport Beach, California, USA, pp. 236-241.
	B8	Cheng, Z.-Y., H. S. Xu, J. Su, Q. M. Zhjang, P.-C. Wang, and A. G. MacDiarmid, "High performance of all-polymer electrostrictive systems," <i>Proceedings of the SPIE International Symposium on Smart Structures and Materials: Electro-Active Polymer Actuators and Devices</i> , March 1-2, 1999, Newport Beach, California, USA., pp. 140-148.
	B9	Cheng, Z.-Y., T.-B. Xu, V. Bharti, S. Wang, and Q. M. Zhang, "Transverse Strain Responses In The Electrostrictive Poly(Vinylidene Fluoride-Trifluorethylene) Copolymer," <i>Appl. Phys. Lett.</i> Vol 74, No. 13, pp. 1901-1903, March 29, 1999.
	B10	Chiarelli, P., A. Della Santa, D. DeRossi, and A. Mazzoldi. 1995. "Actuation Properties of Electrochemically Driven Polypyrrole Free-standing Films," <i>Journal of Intelligent Material Systems and Structures</i> , Vol. 6, pp. 32-37, January 1995
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	C1	De Rossi, D., and P. Chiarelli. 1994. "Biomimetic Macromolecular Actuators," <i>Macro-Ion Characterization, American Chemical Society Symposium Series</i> , Vol. 548, Ch. 40, pp. 517-530.
	C2	Dowling, K., <i>Beyond Faraday-Non Traditional Actuation</i> , available on the World Wide Web at http://www.frc.ri.cmu.edu/~nivek/OTH/beyond-faraday/beyondfaraday.html , 9 pages, 1994
	C3	Egawa, S. and T. Higuchi, "Multi-Layered Electrostatic Film Actuator," <i>Proc. IEEE Micro Electra Mechanical Systems</i> , Napa Valley, California, pp. 166-171 (February 11-14, 1990).
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	C5	Flynn, Anita M., L.S. Tavrow, S.F. Bart, R.A. Brooks, D.J. Ehrlich, K.R. Udayakumar, and L.E. Cross. 1992. "Piezoelectric Micromotors for Microrobots," <i>IEEE Journal of Microelectromechanical Systems</i> , Vol.1, No.1, pp. 44-51 (March 1992); also published as <i>MIT AI Laboratory Memo 1269</i> , Massachusetts Institute of Technology (February 1991).
	C6	Full, R. J. and K. Meijer, "Artificial Muscles Versus Natural Actuators From Frogs To Flies," <i>Proceedings of the 7th SPIE Symposium on Smart Structures and Materials-Electroactive Polymers and Devices (EAPAD) Conference</i> , March 6-8, 2000, Newport Beach, California, USA, pp. 2-9.
	C7	Furuhata, T., T. Hirano, and H. Fujita, "Array-Driven Ultrasonic Microactuators," <i>Solid State Sensors and Actuators</i> , 1991, Digest of Tech. Papers, Transducers, pp. 1056-1059
	C8	Furukawa, T., and N. Seo., "Electrostriction as the Origin of Piezoelectricity in Ferroelectric Polymers," <i>Japanese J. Applied Physics</i> , Vol. 29, No. 4, pp. 675-680 (April 1990).
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	C10	Goldberg, Lee, "Adaptive-Filtering Developments Extend Noise-Cancellation Applications," <i>Electronic Design</i> , February 6, 1995, pages 34 and 36
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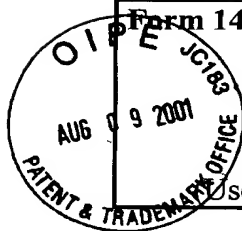
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Other Documents

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	D1	M. Greene and J. A. Willett, and Kornbluh, R., "Robotic systems," in ONR Report 32198-2, Ocean Engineering and Marine Systems 1997 Program (Dec. 1997)
	D2	Heydt, R., R. Peltine, J. Joseph, J. Eckerle, and R. Kornbluh. "Acoustical Performance of an Electrostrictive Polymer Film Loudspeaker", <i>Journal of the Acoustical Society of America</i> Vol. 107, pp. 833-839 (Feb. 2000).
	D3	Heydt, R., R. Kornbluh, R. Peltine, and B. Mason, "Design and Performance of an Electrostrictive Polymer Film Acoustic Actuator", <i>Journal of Sound and Vibration</i> (1998)215(2), 297-311.
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	D7	Hunter, I.W., and S. Lafontaine, "A Comparison of Muscle with Artificial Actuators", <i>Technical Digest of the IEEE Solid-state Sensor and Actuator Workshop</i> , Hilton Head, South Carolina, June 22-25, 1992, pp.178-185.
	D8	Jacobsen, S., Price, R., Wood, J., Rytting, T., and Rafaelof, M., "A Design Overview of an Eccentric-Motion Electrostatic Microactuator (the Wobble Motor)", <i>Sensors and Actuators</i> , 20 (1989) pages 1-16
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	D10	Kawamura, S., K. Minani, and M. Esashi, "Fundamental Research of Distributed Electrostatic Micro Actuator," <i>Technical Digest of the 11th Sensor Symposium</i> , pp. 27-30(1992).
	D11	Kondoh Y., and T. Ono. 1991. "Bimorph Type Actuators using Lead Zinc Niobate-based Ceramics," <i>Japanese Journal of Applied Physics</i> , Vol. 30, No. 9B, pp. 2260-2263, September 1991.
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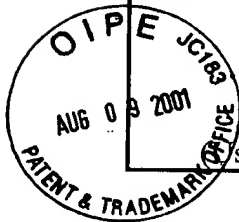


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	E1	Kornbluh, R., G. Andeen, and J. Eckerle, "Artificial Muscle: The Next Generation of Robotic Actuators," presented at the Fourth World Conference on Robotics Research, SME Paper M591-331, Pittsburgh, PA, September 17-19, 1991.
	E2	Kornbluh, R., R. Pelrine, J. Joseph, "Elastomeric Dielectric Artificial Muscle Actuators for Small Robots," <i>Proceedings of the Third IASTED International Conference on Robotics and Manufacturing</i> , June 14-16, 1995, Cancun, Mexico.
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	E5	Kornbluh, R. D and R. E. Pelrine., "Dexterous Multiarticulated Manipulator with Electrostrictive Polymer Artificial Muscle," ITAD-7247-QR-96-175, SRI Project Number 7247, Prepared for: Office of Naval Research, November 1996
	E6	Kornbluh, R., R. Pelrine, Q. Pei, S. Oh, and J. Joseph, 2000. "Ultrahigh Strain Response of Field-Actuated Elastomeric Polymers," Proceedings of the 7th SPIE Symposium on Smart Structures and Materials-Electroactive Polymers and Devices (EAPAD) Conference, March 6-8, 2000, Newport Beach, California, USA, pp. 51-64.
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	E8	Ktech's PVDF Sensors, http://www.ktech.com/pvdf.htm , 06/06/2001, pp. 1-5.
	E9	Lang, J, M. Schlect, and R. Howe, "Electric Micromotors: Electromechanical Characteristics," Proc. IEEE Micro Robots and Teleoperators Workshop, Hyannis, Massachusetts (November 9-11, 1987).
	E10	Liu, Y., T. Zeng, Y.X. Wang, H. Yu, and R. Claus, "Self-Assembled Flexible Electrodes on Electroactive Polymer Actuators," Proceedings of the SPIE International Symposium on Smart Structures and Materials: Electro-Active Polymer Actuators and Devices, March 1-2, 1999, Newport Beach, California, USA., pp. 284-288.
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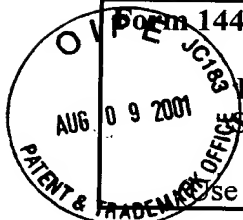


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	F1	Liu, C., Y. Bar-Cohen, and S. Leary, "Electro-statically stricted polymers (ESSP)," Proceedings of the SPIE International Symposium on Smart Structures and Materials: Electro-Active Polymer Actuators and Devices, March 1-2, 1999, Newport Beach, California, USA., pp. 186-190.
	F2	Lawless, W. and R. Arenz, "Miniature Solid-state Gas Compressor," <i>Rev. Sci Instrum.</i> , 58(8), pp.1487-1493, August 1987
	F3	Martin, J. and R. Anderson, 1999. "Electrostriction In Field-Structured Composites: Basis For A Fast Artificial Muscle?", <i>Journal of Chemical Physics</i> , Vol. 111, no. 9, pp.4273-4280, September 1, 1999
	F4	Measurements Specialties, Inc. – Piezo Home, http://www.msiusa.com/piezo/index.htm , 06/06/2001.
	F5	T. B. Nguyen, C. K. DeBolt, Shastri, S. V., and A. Mann, "Advanced Robotic Search," in ONR Ocean, Atmosphere, and Space Fiscal Year 1999 Annual Reports (Dec. 1999)
	F6	Nguyen, T., J. A. Willett and Kornbluh, R., "Robotic systems," in ONR Ocean, Atmosphere, and Space Fiscal Year 1998 Annual Reports (Dec. 1998)
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	F9	Olsson, A., O. Larsson, J. Holm, L. Lundblad, O. Ohinan, and G. Stemme. 1997. "Valve-less Diffuser Micropumps Fabricated using Thermoplastic Replication," <i>Proc. IEEE Micro Electro Mechanical Systems</i> , Nagoya, Japan, pp. 305-310 (January 26-30, 1997).
	F10	Olsson, A., G. Stemme, and E. Stemme, "The First Valve-less Diffuser Gas Pump," Tenth Annual International Workshop on Micro Electromechanical Systems, Nagoya, Japan, <i>IEEE Proceedings</i> (January 26-30, 1997), pp.108-113.
	F11	Otero, T.F., J. Rodriguez, E. Angulo and C. Santamaria, "Artificial Muscles from Bilayer Structures," <i>Synthetic Metals</i> , Vol. 55-57, pp. 3713-3717 (1993).
	F12	Otero, T.F., J. Rodriguez, and C. Santamaria, "Smart Muscle Under Electrochemical Control of Molecular Movement in Polypyrrole Films," <i>Materials Research Society Symposium Proceedings</i> , Vol. 330, pp. 333-338, 1994
	F13	Park, S.E., and T. Shrout., "Ultrahigh Strain and Piezoelectric Behavior in Relaxor Based Ferroelectric Single Crystals," <i>J Applied Physics</i> , Vol. 82, pp. 1804-1811, August 15, 1997
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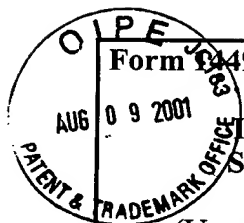
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	G2	Pei <i>et al.</i> , "Improved Electroactive Polymers", U.S. Patent Application No. 09/619,847, filed July 20, 2000, 70 pages
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Form 1449 (Modified) Information Disclosure Statement By Applicant (Use Several Sheets if Necessary)	Atty Docket No. SRI1P029 Applicant: Pelrine, et al. Filing Date 02/07/01	Application No.: 09/779,373 Group 2834
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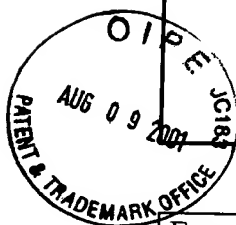


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Form 1449 (Modified)

**Information Disclosure
Statement By Applicant**

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